



Intel® Software Development Products  
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# Accelerating One of the World's Fastest Databases

“The MySQL database is designed from the start to maximize speed. The new Intel C++ Compiler 8.0 amplified this native speed with proven performance gains of more than 20 percent over using GCC 3.3, extending MySQL's position as one of the fastest, most popular databases in the world.”

**David Axmark**  
Co-Founder and Vice President,  
MySQL AB

## Speeding up databases with high-performance compilers

Today's heavy-load business applications and Web-centric client/server environments demand highly responsive database applications. The open-source MySQL® relational database management system (RDBMS), one of the most popular databases in the world, is designed for high speed. The MySQL AB engineers use Intel® tools to gain performance advantages on Intel® architecture-based systems.

## Intel® C++ Compiler for best performance

The Intel® C++ Compiler for Linux® makes it easy to get outstanding performance from Intel processors, including: the

Intel® Pentium® M processor, a component of Intel® Centrino™ mobile technology; Pentium 4 processor supporting Hyper-Threading Technology, Intel® Xeon™ processor, and Intel® Itanium® and Itanium 2 processors. The Intel C++ Compiler produces great performance for applications by providing optimization technology, threaded application support, features to take advantage of Hyper-Threading Technology, and compatibility with leading tools and standards. The Intel C++ Compiler delivers leading-edge performance, excellent compatibility and first-class customer support.

## THE APPLICATION

### Powering open-source database-driven applications

With an estimated 4 million installations and over 35,000 downloads per day, MySQL is the world's most popular open source database.<sup>1</sup> Designed for Web site and application development and deployment, it offers a rich but streamlined feature set, and is part of the well-known LAMP<sup>2</sup> open-source software stack. MySQL AB develops, markets and supports the MySQL database server.

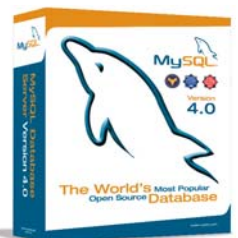
As the heart of many high-volume, business-critical applications, MySQL database maximizes the speed, reliability and value of Web sites and business applications. Increasingly found in business, government and academic environments, it powers resource-intensive Web sites, data warehouses, e-commerce, business-critical enterprise applications, and is embedded into third-party software and hardware.

## THE CHALLENGE

### Optimizing open-source database for Intel® processors

The MySQL AB engineers wanted to identify performance bottlenecks and also areas of optimization concern for MySQL database running on the latest Pentium 4 and Itanium 2 processor-based systems.

They used the SetQuery® benchmark to optimize and measure the performance of the open source MySQL database on Pentium 4 and Itanium 2 processors. They began by measuring the time that MySQL database took to execute the SetQuery runs.



MySQL® is available under the free software/open source GNU general public license (GPL) or a non-GPL commercial license. For more information about MySQL, please go to [www.mysql.com](http://www.mysql.com).

The SetQuery benchmark measures database performance in a decision-support context. Also known as data-mining or management reporting, this benchmark calculates database performance in situations where querying the data is a key to the application performance as opposed to reading and writing records back into databases.

## THE ANSWER

### Eliminating bottlenecks, increasing speed

The MySQL AB engineers benchmarked code compiled by the GNU C Compiler (GCC) and the Intel C++ Compiler for Linux on Pentium 4 and Itanium 2 processor-based systems. The MySQL AB team relied on the Intel® Premier Support team for technical assistance during this exercise.

Because of the versatility of the Intel C++ Compiler, the MySQL AB engineering team used different sets of compiler switches: the regular -O1/-O2 switches, and a more aggressive switch set. They compared these results to the GCC-compiled code with similar options.

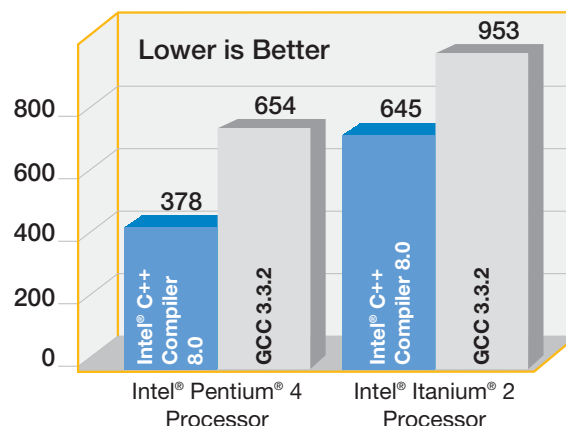
The user times showed that the MySQL code generated using the Intel C++ Compiler performed from 27 to 42 percent faster than similar GCC-generated code running on Pentium 4 and Itanium 2 processor-based systems.<sup>7</sup> "The MySQL database is designed from the start to maximize speed. The new Intel C++ Compiler 8.0 amplified this native speed with proven performance gains of more than 20 percent over using GCC 3.3, extending MySQL's position as one of the fastest, most popular databases in the world," stated David Axmark, MySQL AB Co-Founder and Vice President.

## THE ADVANTAGE

### Achieving faster performance

The Intel C++ Compiler improved the performance of the MySQL code between 27 to 42 percent for Pentium 4 and Itanium 2 processor-based servers.

With this accelerated performance, the Intel C++ Compiler for Linux and MySQL database redefine the speed and economics of large database applications by maximizing cost savings for users through efficient system utilization and speeding up resource intensive performance for enterprise and Web-based business-critical applications.



User Times for SetQuery* (measured in seconds) <sup>7</sup>	Intel® Pentium® 4 Processor <sup>3</sup>		Intel® Itanium® 2 Processor <sup>4</sup>	
	-O2	Aggressive <sup>5</sup>	-O1	Aggressive <sup>5</sup>
Intel C++ Compiler 8.0	378	369	645	632
GCC 3.3.2	654	585	953	862
<b>Performance Improvement</b>	<b>42%</b>	<b>37%</b>	<b>32%</b>	<b>27%</b>

Intel® C++ Compiler-generated MySQL\* code performs from 27% to 42% faster than GCC-generated code on the latest Pentium 4 and Itanium 2 processor-based systems<sup>7</sup>

<sup>1</sup> MySQL Web site 2003 [www.mysql.com](http://www.mysql.com)

<sup>2</sup> LAMP is usually referred to as Linux, Apache, MySQL, PHP/Perl/Python.

<sup>3</sup> The performance data has been provided by MySQL AB. The tests were performed using MySQL version 4.1.1 (No Query Cache), Intel C++ Compiler 8.0 for Linux\* and the GNU C Compiler 3.3.2. The operating system for the Pentium 4 processor-based server was SuSE\* 8.2, and hardware specifications were Pentium 4 processor, 2.8 GHz, 256 MB RAM, cache 512K.<sup>7</sup>

<sup>4</sup> The performance data has been provided by MySQL AB. The tests were performed using MySQL version 4.1.1 (No Query Cache), Intel C++ Compiler 8.0 for Linux and the GNU C Compiler 3.3.2. The operating system for the Itanium 2 processor-based server was Red Hat Linux\* AS 2.1, and hardware specifications were Itanium 2 processor, 900 MHz, 1.5 MB L3 cache.<sup>7</sup>

<sup>5</sup> Intel® C++ Compiler Aggressive Switches for Pentium 4 processor: -O3 -ip -unroll2 GCC 3.3.2 Aggressive Switches for Pentium 4 processor: CXXFLAGS=CFLAGS + -felide-constructors -fno-exceptions -fno-rtti CFLAGS=-O3 -mcpu-pentium4 -march=pentium4 -freduce-all-givs -mno-align-stringops -fno-omit-frame-pointer

<sup>6</sup> Intel® C++ Compiler Aggressive Switches for Itanium 2 processor: -O1 -ip GCC 3.3.2 Aggressive Switches for Itanium 2 processor: CXXFLAGS=CFLAGS + -felide-constructors -fno-rtti -fno-exceptions CFLAGS=-O3 -fomit-frame-pointer

<sup>7</sup> Performance information provided by MySQL AB. Buyers should consult other sources of information to evaluate the performance of systems or components they are considering purchasing. For more information on performance tests and on the performance of Intel products, go to [www.intel.com/software/products](http://www.intel.com/software/products)

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